The Claims Defining the Invention are as Follows

1. A ribbon width detection coil for a probe of an apparatus adapted for detecting NQR signals of a targeted substance from within an item examined for such, the coil comprising:

a pair of turns, one part of each turn being much wider than the other part;

said turns being arranged in an inverse manner to circumscribe a target volume with open ends, whereby:

(i) said one part of each turn is situated at an end and at a side of the coil, and said other part of each turn is situated at an opposing end and opposing side of the coil;

(ii) said other part of one turn being disposed at one end and at one side of the coil, and said other part of the other turn being disposed at the opposite end and opposite side of the coil;

(iii) said one part of said one turn being disposed to extend to the opposite end and at the opposite side of the coil to said other part of the same turn, and said one part of said other turn being disposed to extend to the opposite end at the opposite side of the coil to said other part of the same turn; and

(iv) neither turn having contact with the other at its edges; and

said turns being marginally spaced apart to define a longitudinal gap therebetween.

2. A detection coil as claimed in claim 1, wherein a multiplicity of capacitors are placed between the wider one parts of the turns of the coil, across and along the gap to enable selective tuning over a range of frequencies.

3. A detection coil as claimed in claim 2, wherein said turns and said capacitors are connected to provide a balanced circuit for the detection coil.

4. An apparatus for detecting a substance within items to be examined, comprising:

a plurality of discrete detection sub-units each dedicated to detecting a particular nuclear or electronic resonance signal within a specific frequency band;

each detection sub-unit having a detection coil adapted for tuning to a resonance frequency within the specific frequency band;

said detection coils being arranged so that examined items are input thereto from an incoming line of items and pass through the coils in a predetermined manner; and

said detection sub-units being operable to simultaneously detect a substance in said examined items using said detection coils according to the particular resonance frequency to which the detection coil thereof is tuned.

5. An apparatus as claimed in claim 4, wherein said substance and the particular resonance frequency are the same for each of the sub-units, respectively.

6. An apparatus as claimed in claim 4, wherein said substance and the particular resonance frequency are different for each of the sub-units.

7. An apparatus as claimed in claim 6, wherein one of said sub-units is designed to operate in the high frequency band, and another of said sub-units is designed to operate in the low frequency band, said detection coil of said one sub-unit being a high frequency detection coil, and said detection coil of said other sub-unit being a low frequency detection coil.

8. An apparatus as claimed in any one of claims 4 to 7, wherein the longitudinal axis of one detection coil is either angularly or transversely displaced, or both, from another detection coil disposed adjacent thereto.

9. An apparatus as claimed in any one of claims 4 to 8, wherein the detection technology used is NQR, NMR or ESR, or any combination of these.

10. An apparatus as claimed in any one of claims 4 to 9, wherein a said detection coil comprises at least two turns and is arranged to ensure higher RF field homogeneity in the axial direction at the ends of the coil through an appropriate change of the turn width.

11. An apparatus as claimed in claim 10, wherein said detection coil comprises a ribbon width detection coil as claimed in any one of claims 1 to 3.

12. An apparatus as claimed in any one of claims 4 to 11, including a conveyor system comprising a plurality of conveyor sub-units, corresponding to each of said detection sub-units for the purpose of conveying items to be examined into a target volume circumscribed by the corresponding detection coil of said detection sub-unit, each conveyor sub-unit working independently of the other, but having its operation synchronised so that successive flow and optimum positioning of the examined items in the detection coils occurs.

13. An apparatus as claimed in claim 12, as dependent on claim 6 or 7, wherein said conveyor sub-units and said corresponding detection sub-units are arranged sequentially, so that an examined item can be moved by a said conveyor sub-unit into position with respect to said one said sub-unit for detecting the presence of one substance, and then can be moved by another said conveyor sub-unit into position with respect to said other said sub-unit for detecting the presence of another substance, or vice versa.

14. An apparatus for detecting NQR signals for a plurality of substances within items to be examined, as claimed in claim 6 or 7, or any one of claims 8 to 13 as dependent on claims 6 or 7, wherein:

said plurality of discrete detection sub-units are each dedicated to detecting an NQR signal within a specific frequency band, whereby said specific frequency bands are disposed in different regions of a wide frequency range;

each detection sub-unit has a detection coil adapted for tuning to a resonance frequency within a specific frequency band for detection of a specific substance during a prescribed time period;

said detection coils are arranged in a circular fashion about a central axis wherein an item to be examined is conveyed into a target volume of a coil disposed adjacent an entry point, and is discharged from the target volume of a coil disposed at an exit point; and

said detection sub-units are operable to simultaneously detect different or the same substances using said detection coils according to the particular resonance frequency to which the detection coil thereof is tuned, within different coils or at different relative locations about the central axis.

15. An apparatus as claimed in claim 14, wherein said coils are fixedly disposed with respect to said central axis, and said items are conveyed consecutively through the coils from the entry point to the exit point, the items being disposed within the target volume of each coil for discrete NQR processing independently of each other for detection of a specific substance to which the particular coil thereof is tuned.

16. An apparatus as claimed in claim 14 or 15, including vertical delivery means to deliver an item for examination to said entry point from above, and a vertical discharge means to discharge an item after examination from said exit point to below the apparatus.

17. An apparatus as claimed in claim 14, wherein said coils are rotatedly disposed with respect to said central axis, said items being conveyed into a target volume of a coil when the coil is disposed at an entry station at said entry point, and discharged from the target volume of the coil when the coil is

disposed at an exit station at said exit point, the detection sub-unit of each coil being adapted to cycle through a series of NQR processing routines for detecting a plurality of different specific substances, independently of, and in parallel with, the other coils, whilst an item is disposed within the target volume thereof during the passage of each coil from the entry station to the exit station, so that the detection process is completed for all substances being detected for an examined item by the time that the coil reaches the exit station.

18. An apparatus as claimed in any of claims 4 to 17, including an external electromagnetic shield common to all of the detection coils for shielding all of the detection coils simultaneously from external RF interference.

19. An apparatus as claimed in claim 18, as dependent on any one of claims 14 to 16, wherein waveguides are omitted from said external electromagnetic shield at said entry point and said exit point of the apparatus.

20. An apparatus as claimed in claim 18, as dependent on claim 14 or 17, wherein waveguides are provided to said external electromagnetic shield at said entry point and said exit point of the apparatus.

21. An apparatus as claimed in claim 20, wherein the waveguides are configured to enable the detection coils to rotate past without contacting the waveguides.

22. A method for detecting a substance using nuclear or electronic resonance from within items to be examined, the method comprising the following steps:

(a) inputting a first item to be examined into a target volume circumscribed by a first detection coil tuned to a resonance frequency;

(b) inputting a second item to be examined into a target volume circumscribed by a second detection coil tuned to a resonance frequency;

(c) simultaneously detecting the presence of any nuclear and electronic resonance signals in a specific frequency band corresponding to said resonance frequency being detected by the particular coil; and

(d) exiting the examined items from said detection coils; and

(e) repeating steps (a) to (d) with the next items to be examined.

23. A method as claimed in claim 22, wherein the nuclear or electronic resonance is NQR, NMR or ESR, or any combination of these, whereby a detection coil is dedicated to detecting said resonance using a particular detection technology.

24. A method as claimed in claim 22 or 23, wherein the resonance frequency and the substance being detected are the same for each of the detection coils.

25. A method as claimed in claim 22 or 23, wherein the resonance frequency and the substance being detected are different for each of the detection coils.

26. A method as claimed in claim 25, comprising:

(a) detecting the presence of any NQR signals in the first detection coil in a specific frequency band corresponding to said first resonance frequency immediately after locating the first item into the target volume of the first detection coil;

(b) transporting the first examined item into the target volume of the second detection coil the second detection coil being tuned to a second resonance frequency different from the first resonance frequency, while at the same time transporting a second item to be examined to the target volume of the first detection coil;

(c) simultaneously detecting the presence of any nuclear or electronic resonance signals in both coils;

(d) exiting the first examined item from the second detection coil and simultaneously transporting the second examined item into the target volume of the second detection coil, while at the same time transporting a third item to be examined to the target volume of the first coil;

(e) simultaneously detecting the presence of any nuclear or electronic resonance signals in both coils; and

(f) repeating the process successively from step (b) to (e) with successive items to be examined, until all items desired to be examined for the presence of particular substances having nuclear or electronic resonance signals corresponding to the resonance frequencies of said detection coils have been examined for the presence of such signals.

27. A ribbon width detection coil for a probe of an apparatus adapted for detecting NQR signals of a targeted substance substantially as described herein with reference to the accompanying drawings where appropriate.

28. An apparatus for detecting a substance substantially as described herein with reference to the accompanying drawings where appropriate.

29. A method for detecting a substance using nuclear or electronic resonance substantially as described herein with reference to the accompanying drawings where appropriate.